

RESTRICTION REQUIREMENT UNDER 35 U.S.C. §121

Applicants hereby affirm the provisional election made with traverse of Group I, claims 1-9, and made with traverse in a telephone conversation with the Examiner. The grounds for traverse are as follows.

In order to properly maintain a restriction requirement under 35 U.S.C. §121, two distinct criteria must be satisfied. Namely, as set forth in MPEP §803, (1) the subjects of the claimed inventions must be shown to be either distinct or independent, and (2) it must be shown that examination of the two separately claimed inventions together in a single application would pose a "serious burden" to the Examiner. It is submitted that at least the second of these criteria has not been satisfied. In particular, the nature and relationship between the two separately claimed inventions are such that examination together of claims 1-9 and claims 10-20 in a single application would not pose a "serious burden" to the Examiner. Thus, reconsideration and withdrawal of the restriction requirement is respectfully requested.

DOUBLE PATENTING REJECTION

Claims 1-9 are provisionally rejected under the judicially-created doctrine of double patenting over claims 1-3, 9 and 10 of copending U.S. Patent Application 09/077,424 on the grounds set forth in paragraph 9 of the Official Action.

More particularly, it is asserted in paragraph 9 that "the instant claims include thickness limitations, that one of ordinary skill would optimize." This assertion is respectfully traversed. However, in order to advance prosecution, submitted herewith is a Terminal Disclaimer which obviates the rejection.

CLAIM REJECTIONS UNDER 35 U.S.C. §103

Claims 1-12 stand rejected under 35 U.S.C. § 103(a) over U.S. Patent 5,652,045 to Nakamura et al. (hereafter "*Nakamura et al.*"), in view of U.S. Patent No. 5,915,162 to Uchino et al. (hereafter "*Uchino et al.*") or U.S. Patent 5,920,760 to Yoshimura et al. (hereafter "*Yoshimura et al.*") or U.S. Patent No. 5,545,490 to Oshika (hereafter "*Oshika*") in view of U.S. Patent No. 5,545,490 to Ostlund et al. (hereafter "*Ostlund et al.*") or U.S. Patent No. 5,451,469 to Gustafson et al. (hereafter "*Gustafson et al.*") or U.S. Patent No. 4,610,931 to Nemeth et al. (hereafter "*Nemeth et al.*") on the grounds set forth in paragraph 9 of the Official Action. For at least the reasons noted below, the rejection should be withdrawn.

Initially, it is noted that claims 10-12 are directed to a method of making a cutting tool insert. It was indicated in paragraph 4 of the Official Action that claims 10-20 were withdrawn from consideration. Therefore it is unclear whether claims 10-12 have been examined on the merits. Clarification of the status of claim 10-12 is respectfully requested.

The present invention is directed to a coated cutting tool and its method of production. According to the present invention, it has now surprisingly been found that by combining a particular substrate with a particular coating structure, a cutting tool is produced which has improved properties and resists many of the conventional wear types experienced by such material when incorporated into cutting tools.

A cutting tool formed consistent with the principles of the present invention is embodied in Claim 1. Claim 1 recites a cutting tool insert comprising:

a cemented carbide body comprising

6-15 weight % Co, 0.2-1.8 weight % cubic carbides of Ti, Ta, Nb or any combination thereof, a highly W-alloyed binder phase with a CW-ratio of 0.78-0.93, and the balance WC; and

a coating comprising

a first innermost layer of $TiC_xN_yO_z$ wherein $x+y+z=1$, the first layer having a thickness of 0.1-1.5 μm and equiaxed grains with size $< 0.5 \mu m$,

a second layer of $TiC_xN_yO_z$ wherein $x+y+z=1$, the second layer having a thickness of 0.4-3.9 μm , with columnar grains with an average diameter of 0.1-5.0 μm ,

a third layer of a smooth fine-grained $\kappa-Al_2O_3$ layer with a thickness of 0.5-5.5 μm , and

a total thickness of the first innermost $TiC_xN_yO_z$ and the second $TiC_xN_yO_z$ layer is 0.5-4.0 μm , and the total thickness of all layers is 2.0-6.0 μm .

For at least the reasons noted below, none of the applied references, taken alone or in combination disclose or suggest each and every element recited by Claim 1.

It is asserted in paragraph 9 of the Official Action that *Nakamura et al* or *Uchino et al* or *Yoshimura et al* or *Oshika* discloses the claimed multilayer coating. This assertion is respectfully traversed.

Nakamura et al is directed to a coated tungsten carbide-based cemented carbide blade member. *Nakamura et al* discloses that the first coating layer is formed from one of TiN, TiC, and TiCN, a second layer of TiCN, and a third layer of Al_2O_3 (see, e.g.-column 3, lines 16-19). However, *Nakamura et al* fails to disclose or suggest forming the first coating layer of

claim 1, which requires a particular stoichiometric relationship, and equiaxed grains with a size less than $0.5\ \mu\text{m}$. *Nakamura et al* also fails to disclose the second layer as recited in claim 1, which requires a particular stoichiometric relationship, and columnar grains with an average diameter of $0.1\text{-}5.0\ \mu\text{m}$. *Nakamura et al* additionally fails to disclose the third layer as recited in claim 1, which requires that the $\kappa\text{-Al}_2\text{O}_3$ layer be smooth and fine grained.

Uchino et al is directed to a coated cutting tool and a process for the production thereof. In particular, *Uchino et al* discloses a coating structure in which the first coating layer is formed from either TiCN or a composite layer formed by a first layer of TiN and an additional layer of TiCN, and an outer layer that may include aluminum oxide (see, e.g.-column 5, lines 5-16). However, *Uchino et al* clearly fails to disclose the first coating layer as recited in claim 1 which requires a particular stoichiometric relationship, and equiaxed grains with a size less than $0.5\ \mu\text{m}$. *Uchino et al.* also fails to disclose the third coating layer recited in claim 1, which requires a layer of fine-grained $\kappa\text{-Al}_2\text{O}_3$.

Yoshimura et al is directed to a coated hard alloy blade member. The coating described by *Yoshimura et al* includes an innermost layer of TiCN having unilaterally grown elongated crystals. By contrast, Claim 1 requires a first innermost layer with equiaxed grains of a size which is less than $0.5\ \mu\text{m}$. Therefore, *Yoshimura et al* not only fails to disclose at least this aspect of claim 1, it teaches away from the coating defined by claim 1.

Oshika is directed to a surface coated cutting tool. In the coating described in *Oshika*, an inner layer is disclosed which may include one or more layers of titanium carbide, titanium nitride, titanium carbonitride, titanium carboxide, and titanium oxycarbonitride. However, *Oshika* does not disclose anything with regard to the stoichiometric proportions of the

constituent elements of an inner coating layer the claimed thickness of an inner layer of (0.1-1.5 μm) or second layer (0.4-3.9 μm), or whether the inner coating layer has equiaxed grains of a size $< 0.5 \mu\text{m}$, or whether a second layer has columnar grains with an average diameter of 0.1-5.0 μm . Therefore, *Oshika* clearly fails to disclose the particular coating layer recited in Claim 1.

It is further asserted in paragraph 9 of the Official Action that *Ostlund et al* or *Gustafson et al* or *Nemeth et al* disclose the claimed substrate. This assertion is respectfully traversed.

With regard to the substrate, Claim 1 recites a cemented carbide body including a 6-15 wt. % Co, 0.2-1.8 wt. % cubic carbides of Ta, Ti and Nb, or any combination thereof, and a highly-alloyed binder phase having a CW ratio of 0.78-0.93.

Ostlund et al is directed to a cemented carbide with a binder phase enriched surface zone. *Ostlund et al* discloses that a total amount of cubic carbide phase expressed as the content of metallic elements forming the cubic carbides (i.e.- Ti, Ta, Nb, etc.) is between 6 and 15 wt. % (see, e.g.- column 3, lines 52-55). *Ostlund et al* is silent with regard to any CW ratio. Therefore, it is clear that *Ostlund et al* fails to disclose the cemented carbide body recited in claim 1 of the present invention.

Gustafson et al is directed to a cemented carbide with a binder phase enriched surface zone. *Gustafson et al* describes cemented carbide material as including 4 to 15 wt. % of cubic carbide forming elements. Moreover, *Gustafson et al* fails to disclose any type of CW ratio. Therefore, it is clear that *Gustafson et al* also fails to disclose the recited cemented carbide body of claim 1.

Nemeth et al is directed to a binder phase enriched cemented carbide body and method of its manufacture. The cemented carbide material described in *Nemeth et al* includes between 5 and 10 wt. % cobalt and 20% or less cubic carbide content (see, e.g.- column 5, line 16-19). Moreover, *Nemeth et al* fails to disclose any type of CW ratio. Therefore, *Nemeth et al* also clearly fails to disclose the cemented carbide body recited in Claims 1 and 5.

Based on the above, even if a combination of the above teachings by one of ordinary skill in the art was appropriate, which Applicants assert is not the case, the claimed invention would not result. Reconsideration and withdrawal of the rejections is respectfully requested.

The remaining claims depend either directly or indirectly upon Claim 1. Therefore, these claims are also distinguishable over the applied prior art references for at least the same reasons noted above.

CONCLUSION

From the foregoing, further and favorable action in the form of a Notice of Allowance is earnestly solicited. Should the Examiner feel that any issues remain, it is requested that the undersigned be contacted so that any such issues may be adequately addressed.

Respectfully submitted,

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